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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/685,270
Filing Date: October 14, 2003
Appellant(s): MIKES ET AL.

Jon E. Holland
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed November 28, 2005 appealing from the Office action mailed August 24, 2005.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,263,127	Dragone et al.	7-2001
6,266,140	Xiang et al.	7-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dragone et al. (6,263,127) in view of Xiang et al. (6,266,140). Dragone et al. (6,263,127), wherein after referred to as "Dragone", teaches a free-space multiplexer and demultiplexer wherein multi-wavelength component light enters a free-space multiplexer and demultiplexer – which could also be considered a spectrometer – via an input optical fiber interface (e.g., 102) interface. Within the spectrometer, the light is reflected off of a diffraction grating (e.g., 501) that spectrally separates the multi-wavelength light into its constituent wavelength component signals. Following, constituent wavelength component signals are directed to a plurality of output fibers (e.g., 502 – 505). (See e.g., Col. 3, ll. 35 – Col. 4, ll. 60; Figs. 4 and 5)

Additionally, as Dragone discusses (See e.g., Col. 1, ll. 14 – 55) it is well known in the art that the same device may multiplex and demultiplex optical signals.

However, Dragone does not explicitly teach that the free-space multiplexer and demultiplexer comprises a concentric spectrometer.

Xiang et al. (6,266,140), herein after referred to as "Xiang" teaches an aberration correcting concentric spectrometer wherein multi-wavelength component light is reflected from a mirror (30) onto an aberration corrected diffraction grating (100) that spectrally separates the multi-wavelength light into its constituent wavelength component signals. Following, the individual channels are reflected from a concave mirror (40) and directed to an output device (50).

It would have been obvious to one of ordinary skill in the art at the time of the invention to employ an efficient multiplexing device, such as a concentric spectrometer taught by Xiang, in a multiplexing/demultiplexing device such as the one taught by Dragone. One of ordinary skill in the art at the time of the invention would have been motivated to incorporate an aberration corrected concentric spectrometer such as taught by Xiang, into the multiplexer and demultiplexer of Dragone; because Xiang teaches that an aberration corrected concentric spectrometer may reduce the crosstalk (i.e. increase resolution) between the constituent wavelength component signals of a demultiplexer (See e.g., Col. 1, ll. 15-45) and as Dragone acknowledges, suppressing the inter-signal crosstalk from the constituent wavelength component signals is advantageous (See e.g., Col 1, ll. 15-25).

(10) Response to Argument

Appellant's arguments are not persuasive. Regarding claims 1,2, and 4-7; Appellant argues that there is insufficient motivation to employ a concentric spectrometer such as taught by Xiang et al. (6,266,140) in the demultiplexer of Dragone (6,262,127).

Dragone teaches a free-space multiplexer and demultiplexer wherein multi-wavelength component light enters a free-space multiplexer and demultiplexer via an input optical fiber interface (e.g., 102) interface. The multiplexer and demultiplexer of Dragone employs a diffraction grating (e.g. 401) comprising a plurality of parallel groves and is considered a "free-space" device because the light waves are not confined to a fiber or other waveguide during the multiplexing or demultiplexing. It can also be considered a spectrometer because an optical demultiplexer accepts light, which comprises a plurality of individual wavelengths (or frequencies), and separates the light into separate signals each comprising a constituent wavelength (see e.g. Figure 4 of Dragone). Following, a multiplexer performs the opposite function of a demultiplexer and as Dragone discusses (see e.g., Col. 1, ll. 14 – 55) it is well known in the art that the same device may multiplex and demultiplex optical signals – it is just a matter of which way light is sent through the device.

Xiang teaches a free space concentric spectrometer that accepts a light signal comprising a plurality of wavelengths in the visible light spectrum and separates it into constituent wavelength signals (or "spectra"), which subsequently impinge on a CCD detector. Xiang teaches that concentric spectrometers are well known for their ability to separate hundreds of individual wavelengths of light (spectra) at the same time, while limiting the spatial interaction of adjacent spectra – i.e. crosstalk. (Col. 1, ll. 20-25)

The aberration corrected concentric spectrometer of Xiang employs a convex diffraction grating (100) that includes a plurality of curved and typically nonparallel grooves (102) rather than the parallel grooves of a conventional spectrometer (or demultiplexer/multiplexer). Xiang teaches that this design will allow greater optical power, which will help prevent each demultiplexed wavelength (spectra) from physically overlapping to adjacent wavelengths on a CCD detector – i.e. it provides aberration correction. (See Col. 2, ll. 58 – Col. 3, ll. 5) Thus, a highly accurate spectral image with greatly improved resolution (i.e. reduced crosstalk) is created. (Col. 1, ll. 44-45)

Appellant argues that "the types of light being processed by the router of Dragone and the concentric spectrometer of Xiang are quite different" (page 6, lines 7-8) because "the 'images' of Xiang, unlike the optical data 'signals' of Dragone, do not usually convey digital data and are not typically transmitted through optical fibers" (page 6, lines 3-4) This argument is not persuasive because while Xiang teaches the demultiplexing of light signals in the visible wavelength spectrum and Dragone teaches data communication signals which typically are not found in the visible spectrum, the spectrometer of Xiang employs a similar (yet improved) diffraction grating as employed by Dragone for free space demultiplexing light signals. One of ordinary skill in the art would have known that the range of wavelengths to be demultiplexed in a particular device is a function of the diffraction grating spacing. Regarding Appellant's assertion that the light of Xiang is provided via a slit rather than an optical fiber: a spectrometer (or demultiplexer/multiplexer) will interact with light in the same manner independent of how the light is delivered to the device – i.e. through a slit of a fiber.

The free space demultiplexing of a light signal (i.e. separating spectra) via a diffraction grating and sending the constituent wavelengths (spectra) to a pixilated CCD detector as taught by Xiang (see Figure 5) is a substantially similar process to the free space demultiplexing of a light signal via a diffraction grating and sending the constituent wavelengths to an optical fiber array in the device of Dragone (see Figure 4).

One of ordinary skill in the art at the time of the invention would have been motivated to incorporate an aberration corrected concentric spectrometer such as taught by Xiang, into the multiplexer and demultiplexer of Dragone; because Xiang teaches that an aberration corrected concentric spectrometer with curved, nonparallel, diffraction grating grooves will reduce adjacent wavelengths (spectra) from spatially overlapping on the CCD, thereby increasing resolution. (See e.g., Col. 1, ll. 15-45 and Col. 2, ll. 58 – Col. 3, ll. 5 of Xiang) The overlapping of adjacent wavelengths is commonly referred to as "crosstalk" in the optical demultiplexing art and as Dragone acknowledges, suppressing the inter-signal crosstalk from the constituent wavelength component signals is advantageous (See e.g., Col 1, ll. 15-25).

Regarding claims 3, 8, and 9; Appellant argues that Xiang et al. (6,266,140) teaches that the concentric spectrometer only disperses spectra (See page 8 of the Appeal Brief) and therefore teaches away from the multiplexing of light. Appellant's argument is not persuasive because as Dragone discusses (see e.g., Col. 1, ll. 14 – 55) it is notoriously well known in the art that without an explicit teaching to the contrary, the same device may demultiplex or multiplex light signals. It would have been obvious to one of ordinary skill in the art at the time of the invention

that when a concentric spectrometer such as taught by Xiang is employed in the device of Dragone, the device would be capable of demultiplexing and multiplexing light.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

James P. Hughes

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